AD-A078 715 FLORIDA UNIV GAINESVILLE CENTER FOR MATHEMATICAL SYS--ETC F/G 12/1
MATHEMATICAL TECHNIQUES FOR NONLINEAR SYSTEM THEORY.(U)
MAY 79 R E KALMAN , E EMRE AFOSR-76-3034

UNCLASSIFIED AFOSR-TR-79-1255 NL

| OF |
AD
A078715

END
DATE
FILMED
1-80
DDC

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

LEVEL II

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: AFOSR-TR-79-1255	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): MATHEMATICAL TECHNIQUES FOR NONLINEAR SYSTEM THEORY,		5. TYPE OF REPORT & PERIOD COVERED: Interim
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): R.E. Kalman, E. Emre		8. CONTRACT OR GRANT NUMBER(s): AFOSR-76-3034
9. PERFORMING ORGANIZATION NAME AND ADDRESS: University of Florida, Center for Mathematical System Theory, Gainesville, FL 32601		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 61102F, 2304/A1
11. CONTROLLING OFFICE NAME AND ADDRESS: Air Force Office of Scientific Research/NM, Bolling AFB, Washington, DC 20332		12. REPORT DATE: May 1979
		13. NUMBER OF PAGES: 1
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report): UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The main topic of research concerned various algebraic characterizations of F mod G invariant subspaces in linear systems. Module-theoretic characterizations of these subspaces were obtained which showed among other results, that a module structure can be defined maximally on the ratio of V to R where V is the maximal F mod G invariant subspace contained in the Kernal of H and R is the analogous maximal reachability subspace. A final solution of the so-called partial realization problem was obtained.

Accession For
NTIS GRA&I [X]
DDC TAB [ ]
Unannounced
Justification
By
Distribution/
Availability Codes
Dist. | Avail and/or special
A

DDC FILE COPY

AD A078715

79 12 19 190

DD FORM 1 JAN 73 1473

408 710

UNCLASSIFIED

AFOSR-TR- 79-1255 ANNUAL SCIENTIFIC REPORT

Grant AFOSR 76-3034

May 1979

Mathematcial Techniques For Nonlinear System Theory

During the past year, the major effort under this grant was work by the Principal Investigator (R. E. Kalman) and by E. Emre (Postdoctoral Research Associate, partially supported under the grant).

The main topic of interest concerned various algebraic characterizations of F mod G invariant subspaces in linear systems (in the sense of Basile and Wonham). For example, in joint work with M. Hautus (Einhoven Technological University, NETHERLANDS), Emre obtained an explicit characterization using the representation of the transfer matrix in the form $D^{-1}N$. At about the same time, the Principal Investigator obtained module-theoretic characterizations of these subspaces showing, among other results, that a module structure can be defined maximally on V_{max}/R_{max}, where V_{max} is the maximal F mod G invariant subspace contained in the kernel of H and R_{max} is the analogous maximal reachability subspace. (Here, as usual, (F, G, H) are the defining matrices of the linear system in question.)

While these results may at first sight appear to be rather technical, they are necessary and very important in order to understand the theory of such subspaces and answer questions related to practical applications. Several papers are now being prepared for publication; these will be reviewed in full in December 1979 in the next renewal proposal.

Emre and Kalman attended the NATO Summer School on Geometric Methods in System Theory (Harvard University) and gave invited lectures presenting some of these results.

Very recently, the Principal Investigator obtained the final solution of the so-called partial realization problem; the writeup of this work is proceeding and will be completed by the end of the year.